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## Technology Department

## COVID-19 Vaccines for Children: The Essential Role of the Pediatric Nurse

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Vaccines have been used for 225 years to prevent disease, are an essential part of children's wellness programs, and for many, have become a rite of passage (National Foundation for Infectious Diseases, 2020). Pediatric nurses administer vaccines daily to children all over the world. Nurses educate parents about vaccines, typical side effects their child may experience, and how to minimize any discomfort.

In 2020, the world is in the throes of a pandemic; therefore, there is a dire need to develop an effective vaccine to prevent the viral spread and save lives. Subsequently, the development of several genetically engineered vaccines, the first of their kind approved for human trials, were tested in an unprecedented time frame, under one year (Abbasi, 2020; Molteni, 2020).

There are currently over 165 vaccines in development and 27 ongoing COVID-19 vaccine trials (Roush, 2020). Early results from trials on adult volunteers (Pfizer Inc., Moderna Inc., AstraZeneca, etc.) are promising, and manufacturers are moving swiftly to obtain Food and Drug Administration (FDA) emergency approval for distribution to the public (Abbasi, 2020; Molteni, 2020). There have been no children under the age of 16 in any U.S. COVID-19 vaccine clinical trials, and one trial (Pfizer Inc.) is just beginning to enroll children ages 12–17 (Cincinnati Children's, 2020).

On August 19, 2020, the U.S. Department of Health and Human Services [HHS] (2020b) authorized state-licensed pharmacists and pharmacy interns to administer vaccines to children ages 3–18 years of age by amending the Declaration Under the Public Readiness and Emergency Preparedness Act (PREP Act), The American Academy of Pediatrics [AAP], (2020a) has taken a stand against the PREP Act amendment stating that “children should receive vaccines with a pediatrician who knows their medical history” (para.5).

This column will review the genetic engineering of the COVID-19 vaccines, discuss the pressing need for children to participate in vaccination trials, and the pediatric nurses' role in COVID-19 vaccination and vaccination advocacy.

## Children and COVID-19

Since the beginning of the pandemic, over 1 million U.S. children, ages 0–17 years, have been infected with the COVID-19 virus (AAP, 2020b); Center for Disease Control and Prevention, [CDC], 2020). Children's infections represent 10% of the COVID-19 cases (Center for Disease Control and Prevention, [CDC], 2020a; Gralton et al., 2020); in

children, most of these cases present in a milder form than the adult population. Although uncommon, as of October 1, 2020, there are over 1000 reported cases of Multisystem Inflammatory Syndrome (MIS-C) in children (1–14 years of age) (CDC, 2020c). Children with MIS-C either had the COVID-19 virus (98%) or were exposed (2%) to someone else who had the COVID-19 virus.

On January 27, 2020, due to high rates of the COVID-19 virus spread through the U.S. population, a national public health emergency was announced; concurrently, routine vaccination rates began to decrease across all age groups (NFID, 2020). A decline in routine vaccination rates was due to decreases in primary care office visits, elective procedures, healthcare providers' interactions, and increases in telemedicine visits (HHS, 2020b).

The COVID-19 virus has not only had a direct effect on children through contracting the disease; indirect effects are only beginning to emerge. Research is just starting to surface, demonstrating the detrimental impact that COVID-19 has had on children. Adverse sequela from the virus stems from the effects of minimizing virus spread and quarantine efforts.

## Genetic Engineering of COVID-19 Vaccines

Once scientists and engineers have access to a pathogen's genome, using technology, they can identify parts of the virus' Messenger RNA (mRNA); each strand is a potential vaccine (Molteni, 2020). Before the COVID-19 vaccines, scientists developed genetically engineered vaccines; however, none of them made it to clinical trials due to a lack of financial backing, mainly due to lack of monetary gain for big pharma's involvement. The U.S. government accelerated the timeline and funding for the COVID-19 vaccine through the Operation Warp Speed (OWS) (HHS, 2020a) initiative. The OWS initiative provided ten billion dollars, a timeline, and resources needed to jump-start vaccine development.

The COVID-19 vaccine is a scientific breakthrough in vaccine development. On January 10, 2020, Chinese researchers shared the genetic code of the coronaviruses' ribonucleic acid (RNA) sequence; this opened the door for genetic researchers to begin developing and testing vaccines (Abbasi, 2020). The technology utilized to create genetically engineered vaccines has the potential for use to treat other viruses and chronic diseases.

The three types of COVID-19 vaccines entering the market that have been tested in adult clinical trials include 1) messenger RNA (mRNA) vaccines; 2) vector vaccines, and; 3) protein subunit vaccines (CDC, 2020d). All but one of the vaccines requires two doses that are

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about 2–3 weeks apart. Additionally, it takes a few weeks for the body to build immunity after the vaccine series.

The mRNA vaccines contain genetic material specific to the COVID-19 virus (Abbasi, 2020; CDC, 2020d). Once the genetic vaccine is administered, the host's cells make the protein antigen that closely mimics the virus. In turn, the human body creates antibodies, T-Cells, and B-lymphocytes, to fight the protein, thus creating memory cells and protection for future exposure to the virus.

The newer gene-based, viral vector, DNA, and RNA vaccines use a technique where the genetic instructions of the COVID-19 virus are inserted into a live weekend virus (i.e., adenovirus) (Abbasi, 2020; CDC, 2020d). Once the vaccine is administered, the weakened viral vector enters the cells. The human body reacts by creating T-cells and B-lymphocytes, thus creating memory cells and protecting future exposure to the virus.

The protein subunit vaccines contain harmless proteins of the COVID-19 virus (Abbasi, 2020; CDC, 2020d). Once the vaccine is administered, the human body reacts by developing T-cells and antibodies to the COVID-19 virus, creating memory cells and protecting future exposure to the virus.

### COVID Vaccine Trials in Children

Children have yet to be included in clinical trials of the COVID-19 vaccine. The AAP (2020b) is calling for children's inclusion in COVID-19 vaccine clinical trials. Thus far, the vaccine trials near the completion stage and awaiting FDA approval only included adult participants.

There are four clinical research sites in the U.S. that have been working since May 2020 to test the efficacy and safety of Pfizer Inc. mRNA COVID-19 vaccine in adults (Cincinnati Children's, 2020). Phase three trials began in October, 2020, two of the clinical sites began adding children ages 12–17 years old to the trials. Moderna Inc. includes children over 11 years of age in their trials in the coming weeks. The current vaccines took approximately ten months for development, testing, approval, mass-production, and distribution is in process. Children and pregnant women are a vulnerable population, but work must continue to ensure that they also receive a vaccine tested for efficacy and safety (AAP, 2020b).

Researchers must take what is known from the adult COVID-19 vaccine trials and continue to conduct trials that include younger children and pregnant women. Continuing trial phases with smaller groups of children and pregnant women, the vaccine may be approved for these vulnerable groups in a more expeditious time frame to minimize the negative impact that COVID-19 has already had on children's lives. Now maybe a time for pediatric nurses to reimagine outcomes-based research in the settings in which they practice (Gratton et al., 2020).

### The Unknowns and Fears About COVID-19 Vaccines

There is much that is unknown about the COVID-19 vaccines. To start, the duration that the vaccine protects individuals and if and when a booster will be necessary to maintain immunity is not known. The current recommendation from the CDC (2020b) is that even if a person had COVID-19, they should receive a vaccination; there is not enough information on natural immunity and vaccine-induced immunity. It is unknown how many people will choose the COVID-19 vaccination and or if there will be requirements for vaccination by employers or school environments. Also, the cost of the vaccine for governments and individuals is unknown (Roush, 2020). Lastly, there is no evidence on when to vaccinate children or pregnant women and the effects of the vaccine on this population.

There is already much hype in the media, creating anxiety for adults about taking the COVID-19 vaccine (Tyson et al., 2020). Adults can often be overheard asking one another, "Will you take the vaccine?" Generally, there are public concerns that scientists developed the vaccine

too quickly and that there is not enough information to know if it works. To achieve herd immunity, 55%–82% of the population needs to be immune from the COVID-19 virus, either from natural or vaccination or prior infection (Roush, 2020). Public acceptance of COVID-19 vaccination is crucial.

There are racial disparities in adults' likelihood to get a vaccination. A Pew Foundation poll found "Black adults are much less likely to say they would get a vaccine than other Americans: Just 32% of Black adults say they would definitely or probably get a COVID-19 vaccine, compared with 52% of White adults, 56% of Hispanics and nearly three-quarters (72%) of Asian Americans. (Asian adults were interviewed in English only.)" (Tyson et al., 2020 para.6.) If parents have fears about taking the COVID-19 vaccine, will they refuse to have their children vaccinated?

### Nurses' Role in COVID-19 Vaccine Administration

The primary action that pediatric nurses can take is to educate themselves about the COVID-19 vaccine with evidence-based information. Pediatric nurses are accustomed to approaching parents and patients with evidence-based vaccine information and allaying their fears. Nurses realize that parents' anxieties stem from inaccurate information shared by well-meaning friends and family members or erroneous information posted on the Intranet and social media sites. The measles, mumps, and rubella (MMR) vaccine is one example of a vaccine where the Intranet information has created confusion and anxiety for parents.

Pediatric nurses are the experts at administering vaccines to children. When administering a vaccine, nurses consider the child's age and developmental level, the caregiver's anxiety, and the number of vaccines due to be distributed (Stevens & Marvicsin, 2016). Pediatric nurses instruct caregivers on how to hold their child's position steady and comfort them at the same time.

Pediatric nurses interact with children of all ages. They can continue to advocate for them by reviewing vaccination histories wherever and whenever they interact with them and their families in the healthcare or school setting. Noting missed vaccinations, helping caregivers create a vaccine "catch-up" schedule if a child is off track, and offering guidance to vaccination services for Medicaid and uninsured families will help maintain the child's wellbeing and minimize hospitalizations.

The Advisory Committee on Immunization Practices (Advisory Committee on Immunization Practices (ACIP), 2020). Workgroup released their initial multi-phased plan for vaccine allocation on December 1, 2020. If the vaccine trials demonstrate that COVID-19 vaccines are safe and effective, the FDA will approve the vaccine, and it will be available for distribution in a matter of days. The government will rely on healthcare workers to educate the public about the efficacy and safety of the COVID-19 vaccine (CDC, 2020e). Many nurses will be recipients of the first phase of mRNA vaccine administration. Just as other vaccines are required of all healthcare workers to work in a hospital, it will be interesting to see if institutional policies for mandatory COVID-19 vaccinations for all healthcare workers follow. Pediatric nurses could be role models for parents and children for whom they care by being vaccinated.

### Summary

The COVID-19 pandemic has affected both children and their families in more ways than is known and will impact many years to come. The promise of new genetically engineered vaccines provides hope for an avenue toward a new normal. Nurses' role in vaccination is crucial. Pediatric nurses are experts in administering childhood vaccinations. Nurses can be advocates by increasing awareness of the need for clinical vaccination trials for children and pregnant mothers. Pediatric nurses' can promote children's wellbeing by administering vaccines, educating

patients and families, and leading campaigns to increase awareness for COVID-19 and routine childhood vaccinations.

## Declaration of Competing Interest

None.

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